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National Eutrophication Survey, Las Vegas, Nev

Prepared for

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NATIONAL EUTROPHICATION SURVEY
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REPORT
ON
DWORSHAK RESERVOIR
CLEARWATER COUNTY
IDAHO
EPA REGION X
WORKING PAPER NO. 779

WITH THE COOPERATION OF THE
IDAHO DEPARTMENT OF HEALTH AND WELFARE
AND THE
IDAHO NATIONAL GUARD
JULY, 1977

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16. ABSTRACT

Annual total phosphorus and total nitrogen loadings to the lake were estimated and subdivided according to either point or non-point source origin. An assessment of the lake's trophic condition and limiting nutrient is also provided. All data collected by the U.S.E.P.A. National Eutrophication Survey during the one year study of the lake and its tributaries are included in the report.

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REPORT ON DWORSHAK RESERVOIR

CLEARWATER COUNTY, IDAHO

EPA REGION X

by

National Eutrophication Survey

Water and Land Quality Branch
Monitoring Operations Division
Environmental Monitoring & Support Laboratory
Las Vegas, Nevada

and

Special Studies Branch
Corvallis Environmental Research Laboratory
Corvallis, Oregon

Working Paper No. 770

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U.S. ENVIRONMENTAL PROTECTION AGENCY

July 1977

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FOREWORD

The National Eutrophication Survey was initiated in 1972 in response to an Administration commitment to investigate the nationwide threat of accelerated eutrophication to freshwater lakes and reservoirs.

OBJECTIVES

The Survey was designed to develop, in conjunction with state environmental agencies, information on nutrient sources, concentrations, and impact on selected freshwater lakes as a basis for formulating comprehensive and coordinated national, regional, and state management practices relating to point source discharge reduction and nonpoint source pollution abatement in lake watersheds.

ANALYTIC APPROACH

The mathematical and statistical procedures selected for the Survey's eutrophication analysis are based on related concepts that:

a. A generalized representation or model relating sources, concentrations, and impacts can be constructed.

b. By applying measurements of relevant parameters associated with lake degradation, the generalized model can be transformed into an operational representation of a lake, its drainage basin, and related nutrients.

c. With such a transformation, an assessment of the potential for eutrophication control can be made.

LAKE ANALYSIS

In this report, the first stage of evaluation of lake and watershed data collected from the study lake and its drainage basin is documented. The report is formatted to provide state environmental agencies with specific information for basin planning [§303(e)], water quality criteria/standards review [§303(c)], clean lakes [§314(a,b)], and water quality monitoring [§106 and §305(b)] activities mandated by the Federal Water Pollution Control Act Amendments of 1972.

Beyond the single lake analysis, broader based correlations between nutrient concentrations (and loading) and trophic condition are being made to advance the rationale and data base for refinement of nutrient water quality criteria for the Nation's freshwater lakes. Likewise, multivariate evaluations for the relationships between land use, nutrient export, and trophic condition, by lake class or use, are being developed to assist in the formulation of planning guidelines and policies by the U.S. Environmental Protection Agency and to augment plans implementation by the states.

ACKNOWLEDGMENTS

The staff of the National Eutrophication Survey (Office of Research and Development, U.S. Environmental Protection Agency) expresses sincere appreciation to the Idaho Department of Health and Welfare for professional involvement, to the Idaho National Guard for conducting the tributary sampling phase of the Survey, and to those Idaho wastewater treatment plant operators who provided effluent samples and flow data.

The staff of the State of Idaho Department of Health and Welfare, Division of Environment, provided invaluable lake documentation and counsel during the Survey, reviewed the preliminary reports and provided critiques most useful in the preparation of this Working Paper Series.

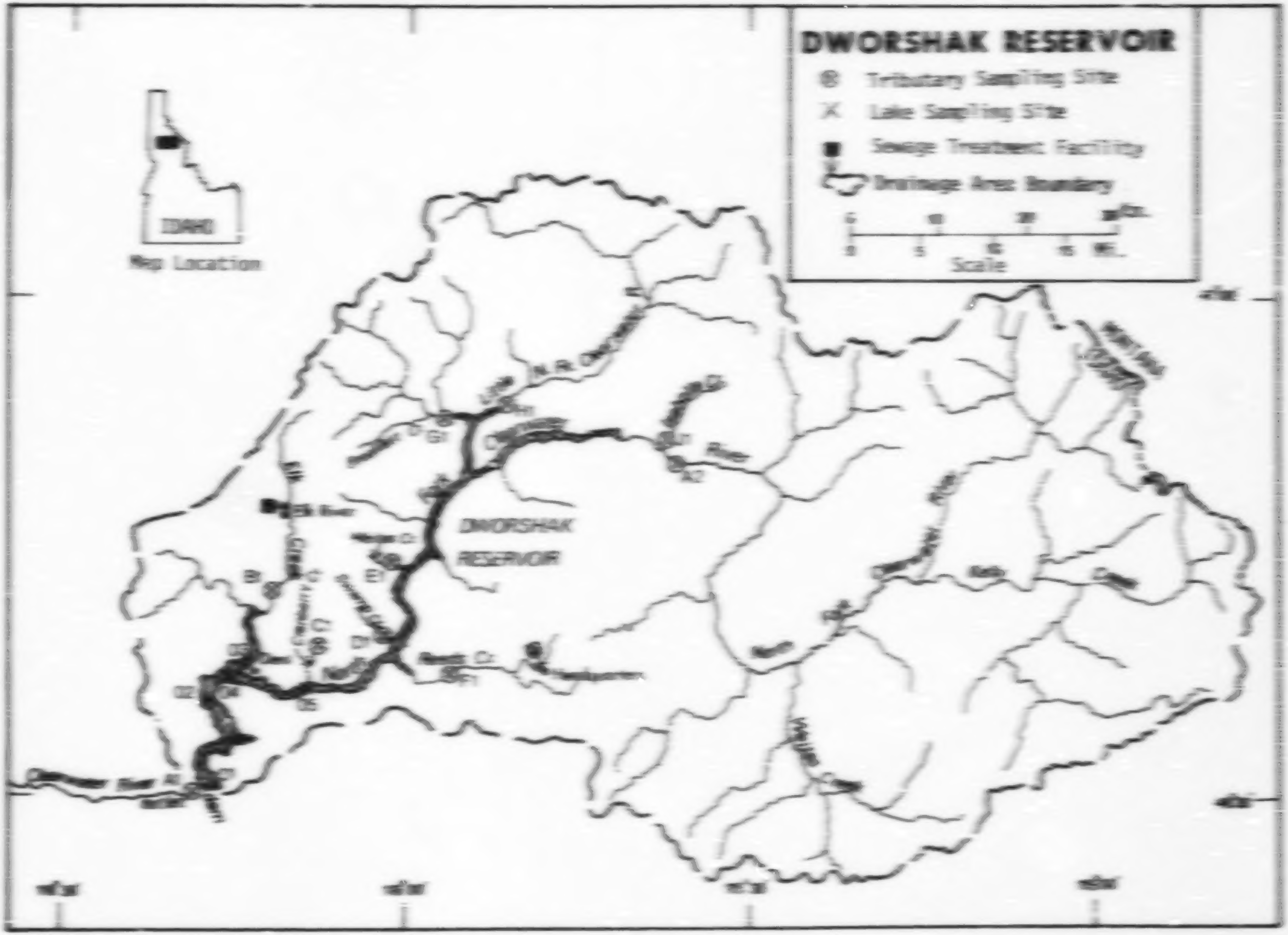
Major General James S. Brooks, Adjutant General of Idaho, and Project Officer Major Vestal L. Baker, who directed the volunteer efforts of the Idaho National Guardsmen, are also gratefully acknowledged for their assistance to the Survey.

NATIONAL EUTROPHICATION SURVEY

STUDY LAKES

STATE OF IDAHO

LAKE NAME	COUNTY
American Falls Reservoir	Bannock, Bingham, Power
Cascade Reservoir	Valley
Coeur d'Alene Lake	Benewah, Kootenai
Dworshak Reservoir	Clearwater
Hauser Lake	Kootenai
Hayden Lake	Kootenai
Island Park Reservoir	Fremont
Lake Lowell (Deer Flat Reservoir)	Canyon
Magic Reservoir	Blaine, Camas
Palisades Reservoir	Bonneville (Lincoln in WY)
Payette Lake	Valley
Lower Twin Lake	Kootenai
Upper Twin Lake	Kootenai


DWORSHAK RESERVOIR
Tributary Sampling Site
Lake Sampling Site
Sewage Treatment Facility
Drainage Area Boundary
0 10 20 30 Km.
0 5 10 15 Mi.
Scale
IDAHO
Map Location
Little N. Fk. Clearwater
Clearwater
DWORSHAK
RESERVOIR
Elk River
Elk
Creek
B1
C1
D1
D2
D3
E1
G1
A1
A2
F1
Reeds Cr.
Clearwater River
Kelly Creek
Weitas Creek

REPORT ON DWORSHAK RESERVOIR, IDAHO

STORET NO. 1604

I. CONCLUSIONS

A. Trophic Condition:*

Based upon Survey data and field observations Dworshak Reservoir is considered oligotrophic. Chlorophyll a values ranged from 0.5 µg/l to 6.7 µg/l in the lake with a mean of 2.4 µg/l. Potential for primary production as measured by algal assay control yields was low. Of the 13 Idaho lakes sampled in 1975, 11 had higher median total phosphorus, 1 had higher median inorganic nitrogen and 5 had higher median orthophosphorus levels than Dworshak Reservoir.

Field limnologists reported Dworshak Resurvoir was a clean and beautiful lake. The Idaho Department of Water Resources et al. (1975) has noted that the lake is of high water quality and low productivity, but that it will be a future site for heavy subdivision and recreational development, and should be watched closely for any deleterious changes.

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*See Appendix E.

B. Rate-Limiting Nutrient:

The algal assay results indicate Dworshak Reservoir was limited by available phosphorus at the times the samples were collected (04/07/75, 09/11/75). The reservoir data suggest primary limitation by nitrogen on all three sampling occasions.

C. Nutrient Controllability:

1. Point Sources -

During the sampling year point sources were estimated to contribute only 0.4% of the total phosphorus loading to Dworshak Reservoir. The towns of Headquarters and Elk River each contributed 0.2% of the total phosphorus load.

The annual phosphorus loading to Dworshak Reservoir of 1.50 g P/m^2/yr is less than Vollenweider's (1975) proposed loading for "eutrophic" lakes but greater than his proposed "oligotrophic" level on the basis of lake mean depth and hydraulic retention time. Any future nutrient inputs to the lake should be carefully evaluated as to their effect on the high water quality of the reservoir.

2. Nonpoint Sources -

Nonpoint sources, including precipitation, were found to contribute 99.6% of the total phosphorus loading to Dworshak Reservoir during the sampling year. The North Fork Clearwater River contributed 53.4% of the total phosphorus load, the Little

North Fork Clearwater River contributed 10.4%, and ungaged drainage areas were estimated to have contributed 19.3%. The Idaho Department of Health and Welfare has also indicated that nutrient contributions to the lake can be expected from bank instability and associated slumping resulting from fluctuations of the reservoir surface elevation (A.E. Murrey, personal communication).

The Elks Creek and Reeds Creek had slightly higher annual phosphorus nutrient exports than would be expected from strictly nonpoint contributions (Section IV-D). The Idaho Department of Water Resources, et al. (1975) report that both of these creeks are effected by upstream sewage and mining contributions, and the U.S. Army District Engineer (1974) states that man-related nonpoint contributions, such as agricultural runoff, are insignificant in terms of their effect on water quality in the reservoir. Additional investigation is needed to determine the extent of these upstream mining and sewage sources before any recommendations on their controllability can be made.

II. LAKE AND DRAINAGE BASIN CHARACTERISTICS

Lake and drainage basin characteristics are itemized below. Lake surface area, mean and maximum depth were provided by Herman Ray (personal communication). Tributary flow data were provided by the Idaho District Office of the U.S. Geological Survey (USGS). Outlet drainage area includes the lake surface area. Mean hydraulic retention time was obtained by dividing the lake volume by mean flow of the outlet. Precipitation values are estimated by methods as outlined in National Eutrophication Survey (NES) Working Paper No. 175. A table of metric/English conversions is included as Appendix A.

A. Lake Morphometry:

1. Surface area: 76.89 km^2.
2. Mean depth: 55.5 meters.
3. Maximum depth: ? meters.
4. Volume: 4,267.875 x 10^6 m^3.
5. Mean hydraulic retention time: 305 days.

B. Tributary and Outlet:
(See Appendix B for flow data)

1. Tributaries -

Name	Drainage area (km^2)	Mean flow (m^3/sec)
A-2 North Fork Clearwater River	3,522.4	106.92
B-1 Elk Creek	240.4	7.30
F-1 Reeds Creek	161.6	4.90
G-1 Breakfast Creek	334.1	11.00
H-1 Little North Fork Clearwater River	678.6	23.00
Minor tributaries and immediate drainage -	1,306.2	43.66
Totals	6,243.3	196.78

2. Outlet - A-1 Clearwater River 6,319.6 161.71

C. Precipitation:

1. Year of sampling: 64.9 cm.
2. Mean annual: 66.2 cm.

III. LAKE WATER QUALITY SUMMARY

Dworshak Reservoir was sampled three times during the open-water season of 1975 by means of a pontoon-equipped Huey helicopter. Each time, samples for physical and chemical parameters were collected from five stations on the lake and from a number of depths at each station (see map, page v). During each visit, depth-integrated samples were collected from each station for chlorophyll a analysis and phytoplankton identification and enumeration. During the first and last visits, 18.9-liter depth-integrated samples were composited for algal assays. The maximum depth sampled at all lake stations was 64.0 meters (the maximum line depth on the helicopter sampling probe). For a more detailed explanation of NES methods, see NES Working Paper No. 175.

The results obtained are presented in full in Appendix C and are summarized in III-A for waters at the surface and at the maximum depth for each site. Results of the phytoplankton counts and chlorophyll a determinations are included in III-B. Results of the limiting nutrient study are presented in III-C.

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STORET CODE [illegible]

PHYSICAL AND CHEMICAL CHARACTERISTICS

	([illegible])				([illegible])				([illegible])			
		S*** = [illegible]		MAX DEPTH RANGE		S*** = [illegible]		MAX DEPTH RANGE		S*** = [illegible]		MAX DEPTH RANGE
PARAMETER	N*	RANGE	MEDIAN	(METERS)	N*	RANGE	MEDIAN	(METERS)	N*	RANGE	MEDIAN	(METERS)
TEMPERATURE (DEG CENT)												
0.-1.5 M DEPTH	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
MAX DEPTH**	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
DISSOLVED OXYGEN (MG/L)												
0.-1.5 M DEPTH	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
MAX DEPTH**	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
CONDUCTIVITY (UMHOS)												
0.-1.5 M DEPTH	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
MAX DEPTH**	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
PH (STANDARD UNITS)												
0.-1.5 M DEPTH	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
MAX DEPTH**	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
TOTAL ALKALINITY (MG/L)												
0.-1.5 M DEPTH	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
MAX DEPTH**	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
TOTAL P (MG/L)												
0.-1.5 M DEPTH	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
MAX DEPTH**	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
DISSOLVED ORTHO P (MG/L)												
0.-1.5 M DEPTH	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
MAX DEPTH**	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
NO2+NO3 (MG/L)												
0.-1.5 M DEPTH	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
MAX DEPTH**	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
AMMONIA (MG/L)												
0.-1.5 M DEPTH	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
MAX DEPTH**	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
KJELDAHL N (MG/L)												
0.-1.5 M DEPTH	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
MAX DEPTH**	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
SECCHI DISC (METERS)	[illegible]	[illegible]	[illegible]		[illegible]	[illegible]	[illegible]		[illegible]	[illegible]	[illegible]	

* N = NO. OF SAMPLES
** MAXIMUM DEPTH SAMPLED AT EACH SITE
*** S = NO. OF SITES SAMPLED ON THIS DATE

B. Biological Characteristics:

1. Phytoplankton -

Sampling Date	Dominant Genera	Algal Unit per ml
04/07/75	1. *Melosira*	1,036
	2. *Chroomonas*	192
	3. *Cryptomonas*	154
	Other genera	- - -
	Total,	1,382
07/23/75	1. *Mallomonas*	286
	2. *Oocystis*	239
	3. *Ankistrodesmus*	95
	4. *Melosira*	48
	Other genera	- - -
	Total	668
09/11/75	1. *Coelosphaerium*	579
	2. *Melosira*	241
	3. *Aphanizomenon*	96
	4. *Ankistrodesmus*	48
	5. *Asterionella*	48
	Other genera	97
	Total	1,109

2. Chlorophyll a -

Sampling Date	Station Number	Chlorophyll a (ug/l)
04/07/75	01	2.2
	02	0.9
	03	1.7
	04	0.6
	06	0.5
07/23/75	01	6.7
	02	4.4
	03	3.0
	04	1.3
	06	3.0
09/11/75	01	2.8
	02	2.8
	03	3.5
	04	1.0
	06	1.9

C. Limiting Nutrient Study:

1. Autoclaved, Filtered, and nutrient spiked -

a. 04/07/75 Stations 01-03

Spike (mg/l)	Ortho P Conc. (mg/l)	Inorganic N Conc. (mg/l)	Maximum Yield (mg/l-dry wt.)
Control	0.008	0.104	0.6
0.05 P	0.058	0.104	3.9
0.05 P + 1.0 N	0.058	1.104	16.9
1.00 N	0.008	1.104	0.6

Stations 04 and 05

Spike (mg/l)	Ortho P Conc. (mg/l)	Inorganic N Conc. (mg/l)	Maximum Yield (mg/l-dry wt.)
Control	0.008	0.072	0.2
0.05 P	0.058	0.072	2.4
0.05 P + 1.0 N	0.058	1.072	18.9
1.00 N	0.008	1.072	0.2

b. 09/11/75 Stations 01-03

Spike (mg/l)	Ortho P Conc. (mg/l)	Inorganic N Conc. (mg/l)	Maximum Yield (mg/l-dry wt.)
Control	0.005	0.050	0.3
0.05 P	0.055	0.050	4.4
0.05 P + 1.0 N	0.055	1.050	18.9
1.00 N	0.005	1.050	0.3

Stations 04 and 05

Spike (mg/l)	Ortho P Conc. (mg/l)	Inorganic N Conc. (mg/l)	Maximum Yield (mg/l-dry wt.)
Control	0.005	0.055	0.4
0.05 P	0.055	0.055	4.0
0.05 P + 1.0 N	0.055	1.055	18.6
1.00 N	0.005	1.055	0.4

2. Discussion -

The control yield of the assay alga, *Selenastrum capricornutum*, indicate that the potential primary productivity in Dworshak Reservoir was low to moderate at the times assay samples were collected (04/07/75, 09/11/75). In all assays, a significant increase in yield occurred when phosphorus was added alone and in combination with nitrogen indicating phosphorus limitation. The addition of only nitrogen resulted in a yield which was not significantly greater than that of the control.

The mean inorganic nitrogen to orthophosphorus ratios (N/P) in the lake data were less than 12/1 on all sampling occasions, suggesting nitrogen limitation (a mean N/P ratio of 14/1 or greater generally reflects phosphorus limitation).

IV. NUTRIENT LOADINGS
(See Appendix D for data)

For the determination of nutrient loadings, the Idaho National Guard collected monthly near-surface grab samples from each of the tributary sites indicated on the map (page v), except for the high runoff month of June when two samples were collected. Sampling was begun in October 1974, and was completed in September 1975.

Through an interagency agreement, stream flow estimates for the year of sampling and a "normalized" or average year were provided by the Idaho District Office of the U.S. Geological Survey for the tributary sites nearest the lake.

In this report, nutrient loads for sampled tributaries were determined by using a modification of the U.S. Geological Survey computer program for calculating stream loadings. Nutrient loads indicated for tributaries are those measured minus known point source loads, if any.

Nutrient loadings for unsampled "minor tributaries and immediate drainage" ("ZZ" of USGS) were estimated by using the mean annual nutrient loads, in kg/km^2/yr, in North Fork Clearwater River, Breakfast Creek and Little North Fork Clearwater River at Stations A-2, G-1 and H-1 and multiplying the means by the ZZ area in km^2.

Nutrient loads for the Headquarters and Elk River wastewater treatment plants were estimated at 1.134 kg P and 3.401 kg N/capita/year.

A. Waste Sources:

1. Known municipal -

Name	Pop.* Served	Treatment*	Mean Flow ($m^3/d \times 10^3$)	Receiving Water
Headquarters	250	Stabilization Pond	0.095**	Reeds Creek
Elk River	250	Stabilization Pond	0.095**	Elk Creek

2. Known industrial - None

---

*U.S. EPA, 1971.
**Estimated at 0.3785 m^3/capita/day.

B. Annual Total Phosphorus Loading - Average Year:

1. Inputs -

Source	kg P/yr	% of total
a. Tributaries (nonpoint load) -		
A-2 North Fork Clearwater River	61,540	53.4
B-1 Elk Creek	6,505	5.6
F-1 Reeds Creek	5,405	4.7
G-1 Breakfast Creek	5,735	5.0
H-1 Little North Fork Clearwater River	12,010	10.4
b. Minor tributaries and immediate drainage (nonpoint load) -	22,205	19.3
c. Known municipal STP's -		
Headquarters	285	0.2
Elk River	285	0.2
d. Septic tanks - None known		
e. Known industrial - None		
f. Direct precipitation* -	1,345	1.2
Totals	115,315	100.0%

2. Output - A-1 Clearwater River 84,025

3. Net annual P accumulation - 31,290

---

*Estimated (See NES Working Paper No. 175).

C. Annual Total Nitrogen Loading - Average Year:

1. Inputs -

Source	kg N/yr	% of total
a. Tributaries (nonpoint load) -		
A-2 North Fork Clearwater River	1,880,085	57.9
B-1 Elk Creek	55,420	1.7
F-1 Reeds Creek	42,320	1.3
G-1 Breakfast Creek	190,205	5.9
H-1 Little North Fork Clearwater Creek	313,375	9.6
b. Minor tributaries and immediate drainage (nonpoint load) -	681,835	21.0
c. Known municipal STP's -		
Headquarters	850	<0.1
Elk River	850	<0.1
d. Septic tanks - None known		
e. Known industrial - None		
f. Direct precipitation* -	83,010	2.6
Totals	3,247,950	100.0%

2. Outputs - A-1 Clearwater River 1,892,860

3. Net annual N accumulation - 1,355,090

---

*Estimated (See NES Working Paper No. 175).

D. Mean Annual Nonpoint Nutrient Export by Subdrainage Area:

Tributary	kg P/km^2/yr	kg N/km^2/yr
North Fork Clearwater River	17	534
Elk Creek	27	230
Reeds Creek	33	262
Breakfast Creek	17	569
Little North Fork Clearwater River	16	462

E. Mean Nutrient Concentrations in Ungaged Streams:

Tributary	Mean Total P (mg/l)	Mean Total N (mg/l)
C-1 Cranberry Creek	0.031	0.643
D-1 Swamp Creek	0.029	0.532
E-1 Weitas Creek	0.033	0.393
J-1 Isabella Creek	0.013	0.516

F. Yearly Loadings:

In the following table, the existing phosphorus loading is compared to the relationship proposed by Vollenweider (1975). Essentially, his "eutrophic" loading is that at which the receiving waters would become eutrophic or remain eutrophic; his "oligotrophic" loading is that which would result in the receiving water remaining oligotrophic or becoming oligotrophic if morphometry permitted. A "mesotrophic" loading would be considered one between "eutrophic" and "oligotrophic."

Note that Vollenweider's model may not be applicable to water bodies with very short retention times or in which light penetration is severely restricted from high concentrations of suspended solids in the surface waters.

	Total Yearly Phosphorus Loading ($g/m^2/yr$)
Estimated loading for Dworshak Reservoir	1.80
Vollenweider's "eutrophic" loading	1.56
Vollenweider's "oligotrophic" loading	0.78

V. LITERATURE REVIEWED

Falter, C. Michael, Rudy R. Ringe, Jack Skille, and Rick Stowell. 1974. Limnology in Dworshak Reservoir in the Second Year after Dam Closure. Interim report submitted to U.S. Army Corps of Engineers, Walla Walla District.

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VI. APPENDICES

APPENDIX A

CONVERSION FACTORS

CONVERSION FACTORS

Hectares x 2.471 = acres

Kilometers x 0.6214 = miles

Meters x 3.281 = feet

Cubic meters x 8.107 x 10^{-4} = acre/feet

Square kilometers x 0.3861 = square miles

Cubic meters/sec x 35.315 = cubic feet/sec

Centimeters x 0.3937 = inches

Kilograms x 2.205 = pounds

Kilograms/square kilometer x 5.711 = lbs/square mile

APPENDIX B

TRIBUTARY FLOW DATA

TRIBUTARY FLOW INFORMATION FOR IDAHO [illegible]

LAKE CODE [illegible] DWORSHAK RESERVOIR

TOTAL DRAINAGE AREA OF LAKE(SQ MI) [illegible]

TRIBUTARY	SUB-DRAINAGE AREA(SQ MI)	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	MEAN
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

SUMMARY

TOTAL DRAINAGE AREA OF LAKE = [illegible]
SUM OF SUB-DRAINAGE AREAS = [illegible]
TOTAL FLOW IN = [illegible]
TOTAL FLOW OUT = [illegible]

MEAN MONTHLY FLOWS AND DAILY FLOWS(CMS)

TRIBUTARY	MONTH	YEAR	MEAN FLOW	DAY	FLOW	DAY	FLOW	DAY	FLOW
[illegible]	10	74	[illegible]	[illegible]	[illegible]				
	11	74	[illegible]	[illegible]	[illegible]				
	12	74	[illegible]	[illegible]	[illegible]				
	1	75	[illegible]	[illegible]	[illegible]				
	2	75	[illegible]	[illegible]	[illegible]				
	3	75	[illegible]	[illegible]	[illegible]				
	4	75	[illegible]	[illegible]	[illegible]				
	5	75	[illegible]						
	6	75	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
	7	75	[illegible]	[illegible]	[illegible]				
	8	75	[illegible]	[illegible]	[illegible]				
	9	75	[illegible]	[illegible]	[illegible]				
[illegible]	10	74	[illegible]	[illegible]	[illegible]				
	11	74	[illegible]	[illegible]	[illegible]				
	12	74	[illegible]	[illegible]	[illegible]				
	1	75	[illegible]	[illegible]	[illegible]				
	2	75	[illegible]	[illegible]	[illegible]				
	3	75	[illegible]						
	4	75	[illegible]	[illegible]	[illegible]				
	5	75	[illegible]						
	6	75	[illegible]	[illegible]	[illegible]				
	7	75	[illegible]	[illegible]	[illegible]				
	8	75	[illegible]	[illegible]	[illegible]				
	9	75	[illegible]	[illegible]	[illegible]				

[illegible] [illegible]

[illegible] [illegible] [illegible]

MEAN MONTHLY FLOWS AND DAILY FLOWS(CFS)

TRIBUTARY	MONTH	YEAR	MEAN FLOW	DAY	FLOW	DAY	FLOW	DAY	FLOW
[illegible]	10	74	[illegible]	[illegible]	[illegible]				
	11	74	[illegible]	[illegible]	[illegible]				
	12	74	[illegible]	[illegible]	[illegible]				
	1	75	[illegible]	[illegible]	[illegible]				
	2	75	[illegible]	[illegible]	[illegible]				
	3	75	[illegible]	[illegible]	[illegible]				
	4	75	[illegible]	[illegible]	[illegible]				
	5	75	[illegible]						
	6	75	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
	7	75	[illegible]	[illegible]	[illegible]				
	8	75	[illegible]	[illegible]	[illegible]				
	9	75	[illegible]	[illegible]	[illegible]				
[illegible]	10	74	[illegible]	[illegible]	[illegible]				
	11	74	[illegible]	[illegible]	[illegible]				
	12	74	[illegible]	[illegible]	[illegible]				
	1	75	[illegible]	[illegible]	[illegible]				
	2	75	[illegible]	[illegible]	[illegible]				
	3	75	[illegible]	[illegible]	[illegible]				
	4	75	[illegible]	[illegible]	[illegible]				
	5	75	[illegible]						
	6	75	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
	7	75	[illegible]	[illegible]	[illegible]				
	8	75	[illegible]	[illegible]	[illegible]				
	9	75	[illegible]	[illegible]	[illegible]				
[illegible]	10	74	[illegible]	[illegible]	[illegible]				
	11	74	[illegible]	[illegible]	[illegible]				
	12	74	[illegible]	[illegible]	[illegible]				
	1	75	[illegible]	[illegible]	[illegible]				
	2	75	[illegible]	[illegible]	[illegible]				
	3	75	[illegible]	[illegible]	[illegible]				
	4	75	[illegible]	[illegible]	[illegible]				
	5	75	[illegible]						
	6	75	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
	7	75	[illegible]	[illegible]	[illegible]				
	8	75	[illegible]	[illegible]	[illegible]				
	9	75	[illegible]	[illegible]	[illegible]				
[illegible]	10	74	[illegible]	[illegible]	[illegible]				
	11	74	[illegible]	[illegible]	[illegible]				
	12	74	[illegible]	[illegible]	[illegible]				
	1	75	[illegible]	[illegible]	[illegible]				
	2	75	[illegible]	[illegible]	[illegible]				
	3	75	[illegible]	[illegible]	[illegible]				
	4	75	[illegible]	[illegible]	[illegible]				
	5	75	[illegible]						
	6	75	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
	7	75	[illegible]	[illegible]	[illegible]				
	8	75	[illegible]	[illegible]	[illegible]				
	9	75	[illegible]	[illegible]	[illegible]				

APPENDIX C

PHYSICAL AND CHEMICAL DATA

STORET RETRIEVAL DATE 76/09/15
NATL EUTROPHICATION SURVEY
EPA-LAS VEGAS

160401
46 31 06.0 116 17 25.0 3
DWORSHAK RESERVOIR
16035 IDAHO

[illegible]

11EPALES 2111202
0000 FEET DEPTH CLASS 00

DATE FROM TO	TIME OF DAY	DEPTH FEET	00010 WATER TEMP CENT	00300 DO MG/L	00077 TRANSP SECCHI INCHES	00094 CNDUCTVY FIELD MICROMHO	00400 PH SU	00410 T ALK CACO3 MG/L	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P
75/04/07	12 00	0000		11.2	40	22	7.10	22	0.070K	0.250	0.050	0.006
	12 00	0005		11.7		23	7.30	21	0.020K	0.250K	0.046	0.011
	12 00	0015		11.8		24	7.30	22	0.070K	0.250K	0.060	0.005
	12 00	0025		10.6		23	7.10	22	0.020K	0.250K	0.060	0.007
	12 00	0050		10.2		23	6.80	22	0.020	0.250K	0.070	0.013
	12 00	0100		9.4		24	7.30	18	0.070	0.250K	0.090	0.009
	12 00	0150		7.6		25	6.90	16	0.070K	0.250	0.110	0.017
	12 00	0250		8.4		25	7.00	17	0.020	0.700K	0.110	0.012
75/07/23	14 40	0000	24.2	8.3	84	31	8.65	16	0.020	0.250K	0.020	0.003K
	14 40	0005	20.4	8.4		32	8.40	15	0.020	0.250K	0.020K	0.003K
	14 40	0020	13.2	8.8		23	7.70	14	0.020	0.250K	0.020K	0.003K
	14 40	0030	11.3	9.6		20	7.50	16	0.020K	0.250K	0.020K	0.003K
	14 40	0060	7.3	10.4		18	7.30	15	0.047	0.250K	0.030	0.012K
	14 40	0100	6.2	10.6		17	7.25	15	0.070	0.250K	0.070	0.012K
	14 40	0160	5.8	10.8		21	7.30	17	0.020	0.250K	0.070	0.013K
	14 40	0175	5.2	9.4		18	6.65	17	0.070K	0.250K	0.040	0.014K
75/09/11	14 27	0000	20.6	8.8	72	23	7.00	26	0.070K	0.250	0.020K	0.006
	14 27	0005	20.6	8.8		16	6.96	20	0.070K	0.300	0.020K	0.003
	14 27	0015	18.3	8.2		12	7.00	23	0.070	0.300	0.020K	0.005
	14 27	0030	18.7	8.8		6	6.85	17	0.070K	0.250	0.020K	0.002
	14 30	0060	5.2	10.2		1	6.95	22	0.070K	0.250	0.040	0.005
	14 27	0130	4.1	10.4		3	6.40	17	0.070K	0.250	0.040	0.005
	14 27	0160	3.1	10.6		5	6.50	22	0.020K	0.250	0.060	0.005
	14 31	0220	2.2	9.6		6	6.60	27	0.070K	0.250K	0.040	0.007

K VALUE KNOWN TO BE LESS
THAN INDICATED

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STORET RETRIEVAL DATE [illegible]                                   160401
NATL EUTROPHICATION SURVEY                                          [illegible]
EPA-LAS VEGAS                                                       DWORSHAK RESERVOIR
                                                                    16035   IDAHO
                                                                                      130491

                                                                    11EPALES          2111202
                                                                     0000 FEET  DEPTH  CLASS 00

                               00665      32217      00031
  DATE    TIME DEPTH PHOS-TOT  CHLRPHYL  INCDT LT
  FROM     OF                     A      REMNING
   TO     DAY  FEET  MG/L P     UG/L     PERCENT

75/04/07 12 00 0000   [illegible]   3.2
         12 00 [illegible] [illegible]
         12 00 [illegible] [illegible]
         12 00 [illegible] [illegible]
         12 00 [illegible] [illegible]
         12 00 [illegible] [illegible]
         12 00 [illegible] [illegible]
         12 00 [illegible] [illegible]
75/07/23 14 40 0000   [illegible]   4.7
         14 40 [illegible] [illegible]
         14 40 [illegible] [illegible]
         14 40 [illegible] [illegible]
         14 40 [illegible] [illegible]
         14 40 [illegible] [illegible]
         14 40 [illegible] [illegible]
         14 40 [illegible] [illegible]
75/09/11 14 10 0000   [illegible]   2.8
         14 10 [illegible] [illegible]
         14 10 [illegible] [illegible]
         14 10 [illegible] [illegible]
         14 10 [illegible] [illegible]
         14 10 [illegible] [illegible]
         14 10 [illegible] [illegible]
         14 10 [illegible] [illegible]
```

STORET RETRIEVAL DATE 76/05/24
NAT'L EUTROPHICATION SURVEY
EPA-LAS VEGAS

160402
46 35 50.0 116 17 14.0 3
DWORSHAK RESERVOIR
16035 IDAHO
130891

11EPALES 2111202
0004 FEET DEPTH CLASS 00

DATE FROM TO	TIME OF DAY	DEPTH FEET	00010 WATER TEMP CENT	00300 DO MG/L	00077 TRANSP SECCHI INCHES	00094 CNDUCTVY FIELD MICROMHO	00400 PH SU	00410 T ALK CACO3 MG/L	00610 NH3-N TOTAL MG/L	00625 TOT KJEL N MG/L	00630 NO2&NO3 N-TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P
75/04/07	12 45	0000	2.7	11.2	78	26	7.10	19	0.030	0.400	0.090	0.013
	12 45	0005	3.2	11.4		26	7.00	19	0.020K	0.200K	0.070	0.013
	12 45	0015	3.2	11.6		26	7.10	19	0.020K	0.200K	0.070	0.009
	12 45	0025	3.0	11.4		26	7.10	18	0.070	0.100	0.070	0.011
	12 45	0050	2.8	11.2		26	6.80	19	0.020	0.200K	0.070	0.025K
	12 45	0100	2.8	11.7		23	7.10	19	0.070K	0.200K	0.070	0.012
	12 45	0150	2.6	11.2		26	7.30	20	0.070	0.200K	0.070	0.015
	12 45	0220	2.4	11.2		25	7.30	21	0.070K	0.200	0.070	0.006
75/07/03	14 25	0000	24.0	8.2	174	32	7.95	15	0.030	0.200K	0.020	0.017K
	14 25	0005	21.6	9.8		30	6.80	15	0.030	0.200K	0.020K	0.013K
	14 25	0025	17.8	10.0		29	7.95	16	0.020	0.200K	0.020K	0.017K
	14 25	0050	11.6	9.6		21	7.95	15	0.070	0.200K	0.020K	0.017K
	14 25	0080	7.2	11.4		19	7.50	15	0.070	0.200K	0.040	0.015K
	14 25	0100	6.4	11.3		19	7.40	15	0.020	0.200K	0.077	0.013K
	14 25	0140	5.7	11.3		15	7.40	14	0.070K	0.200K	0.090	0.013K
	14 25	0175	5.0	10.0		16	7.25	15	0.070K	0.250K	0.070	0.017K
75/09/11	11 45	0000	20.1	9.4	170	19	6.60	10K	0.020K	0.200K	0.020K	0.004
	11 45	0005	20.1	8.6		17	6.60	10K	0.070K	0.200K	0.020K	0.003
	11 45	0025	15.6	8.6		10	6.60	10K	0.020K	0.200K	0.020K	0.003
	11 45	0030	11.6	8.0		5	6.50	10K	0.020K	0.200K	0.020K	0.002
	11 45	0080	5.7	10.2		1	6.50	10K	0.020K	0.200K	0.020K	0.004
	11 45	0120	4.0	10.2		1	6.50	10K	0.020K	0.200K	0.070	0.005
	11 45	0160	3.1	10.4		2	6.50	19	0.070K	0.200	0.060	0.011
	11 45	0210	1.8	9.4		7	5.90	19	0.070K	0.200	0.040	0.006

K VALUE KNOWN TO BE LESS
THAN INDICATED

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STORET RETRIEVAL DATE 76/08/25                                       160402
NATL EUTROPHICATION SURVEY                                          46 35 50.0 116 17 14.0 3
EPA-LAS VEGAS                                                       DWORSHAK RESERVOIR
                                                                    16035   IDAHO
                                                                                         130491

                                                                    11EPALES            2111202
                                                                     0000 FEET  DEPTH  CLASS 00

                            00665      32217      00031
DATE      TIME  DEPTH  PHOS-TOT     CHLRPHYL   INCDT LT
FROM       OF                           A      REMNING
 TO       DAY   FEET    MG/L P        UG/L     PERCENT

75/04/07 12 45 0000     0.017          4.8
         12 45 0005     0.013
         12 45 0015     0.014
         12 45 0025     0.013
         12 45 0040     0.012
         12 45 0100     0.013
         12 45 0150     0.015
         12 45 0213     0.015
75/07/23 14 15 0000     0.012          4.4
         14 15 0005     0.010
         14 15 0025     0.014
         14 15 0030     0.007
         14 15 0060     0.016
         14 15 0100     0.006
         14 15 0140     0.007
         14 15 0175     0.010
75/09/11 11 45 0000     0.016          2.4
         11 45 0005     0.011
         11 45 0020     0.012
         11 45 0030     0.008
         11 45 0060     0.007
         11 45 0115     0.006
         11 45 0160     0.013
         11 45 0210     0.013
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STORET RETRIEVAL DATE 76/10/25                                   160403
NATL EUTROPHICATION SURVEY                                      46 30 10.0 116 14 03.0 3
EPA-LAS VEGAS                                                   DWORSHAK RESERVOIR
                                                                16035   IDAHO
                                                                                 130891

                                                                11EPALES          2111202
                                                                 1125 FEET  DEPTH  CLASS 00

                          00010      00300     00077     00094       00400     00410     00610     00625      00630      00671
   DATE    TIME DEPTH     WATER      DO        TRANSP    CNDUCTVY    PH        T ALK     NH3-N     TOT KJEL   NO2&NO3    PHOS-DIS
   FROM     OF            TEMP                 SECCHI    FIELD                 CACO3     TOTAL     N          N-TOTAL    ORTHO
    TO     DAY  FEET      CENT       MG/L      INCHES    MICROMHO    SU        MG/L      MG/L      MG/L       MG/L       MG/L P

75/04/07 13 25 0000        3.8       11.8        72          24      7.10        21     0.020K    0.400      0.060      0.004
         13 25 0005        3.7                               24      7.00        20     0.020     0.290      0.060      0.003
         13 25 0025        3.7       11.4                    24      7.20        22     0.020K    0.200      0.040      0.003
         13 25 0050        3.7       11.6                    24      7.00        21     0.020K    0.200K     0.060      0.0[illegible]
         13 25 0080        3.6       11.4                    24      7.00        20     0.020     0.200K     0.070      0.007K
         13 25 0117        3.1       11.4                    23      6.80        17     0.020     0.200K     0.070      0.007
75/07/25 15 40 0000       20.4        8.8       138          20      7.75        16     0.030     0.200K     0.020K     0.011K
         15 40 0005       21.4        8.8                    30      7.40        17     0.070     0.200K     0.020K     0.010K
         15 40 0015       16.5       10.3                    23      7.50        18     0.020K    0.200K     0.020K     0.009K
         15 40 0030       11.6       14.7                    21      7.10        10K    0.020     0.200K     0.040      0.010K
         15 40 0070        7.2       10.8                    18      6.85        10K    0.020     0.200K     0.050      0.011K
         15 40 0120        6.1       10.4                    19      6.90        11     0.020     0.200K     0.040      0.012K
         15 40 0175        5.1       10.4                    20      6.95        17     0.070     0.200K     0.060      0.014K
75/09/11 11 15 0000       15.8        9.2        96          22      6.70        14     0.020K    0.200K     0.020K     0.002
         11 15 0005       15.6        9.3                    19      7.20        13     0.020K    0.200K     0.020K     0.002
         11 15 0027       15.3        9.4                    14      7.40        14     0.020K    0.210      0.020K     0.004
         11 15 0037       11.5        7.6                     6      7.20        12     0.020K    0.200K     0.020      0.003
         11 15 0044        5.7       10.3                     1      6.90        12     0.020K    0.200K     0.060      0.004
         11 15 0110        4.1       10.2                     2      6.70        13     0.020K    0.200K     0.040      0.005
         11 15 0160        3.2       10.2                     3      6.75        21     0.020K    0.300      0.042      0.007
         11 15 0254        2.1        9.0                     6      6.55        21     0.020K    0.270K     0.040      0.008


                 K VALUE KNOWN TO BE LESS
                   THAN INDICATED
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STORET RETRIEVAL DATE 76/08/25                                         160403
NAT'L EUTROPHICATION SURVEY                                           46 38 [illegible] 116 14 [illegible] 3
EPA-LAS VEGAS                                                         DWORSHAK RESERVOIR
                                                                      16035   IDAHO
                                                                                         [illegible]

                                                                      11EPALES             2111202
                                                                       0135 FEET  DEPTH  CLASS 00

                          00665      32217      00031
 DATE   TIME DEPTH PHOS-TOT  CHLRPHYL  INCDT LT
 FROM    OF                             A       REMNING
  TO    DAY  FEET   MG/L P            UG/L     PERCENT

75/06/07 13 25 0000   0.025            1.7
         13 25 0005   [illegible]
         13 25 0015   [illegible]
         13 25 0025   [illegible]
         13 25 0050   [illegible]
         13 25 0110   [illegible]
75/07/23 15 40 0000   [illegible]      [illegible]
         15 40 0005   [illegible]
         15 40 0015   [illegible]
         15 40 0030   [illegible]
         15 40 0070   [illegible]
         15 40 0120   [illegible]
         15 40 0175   [illegible]
75/09/13 11 15 0000   [illegible]      [illegible]
         11 15 0005   [illegible]
         11 15 [illegible] [illegible]
         11 15 [illegible] [illegible]
         11 15 [illegible] [illegible]
         11 15 [illegible] [illegible]
         11 15 [illegible] [illegible]
         11 15 [illegible] [illegible]
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STORET RETRIEVAL DATE [illegible]
NATL EUTROPHICATION SURVEY
EPA-LAS VEGAS
                                                            [illegible]
                                                           46 30 35.0 116 01 35.0 3
                                                           DWORSHAK RESERVOIR
                                                           16035   IDAHO
                                                                                 130891

                                                           11EPALES          2111202
                                                            0000 FEET  DEPTH  CLASS 00

                          00010      00300      00077      00094      00400      00410      00610      00625      00630      00671
  DATE     TIME DEPTH    WATER       DO        TRANSP    CNDUCTVY      PH       T ALK      NH3-N    TOT KJEL   NO2&NO3    PHOS-DIS
  FROM      OF           TEMP                  SECCHI     FIELD                 CACO3      TOTAL       N       N-TOTAL    ORTHO
   TO      DAY  FEET     CENT       MG/L       INCHES    MICROMHO     SU        MG/L       MG/L       MG/L      MG/L      MG/L P

75/04/07  12 29 0000       4.3       11.0         96          15      6.90         13     0.070     0.200     0.080     0.008
          12 29 0005       4.2       10.6                     17      6.70         12     0.030     0.200K    0.070     0.007
          12 29 0015       4.2       11.2                     17      6.60         14     0.070     0.200K    0.060     0.011
          12 29 0045       4.1       11.0                     17      6.50         13     0.020     0.200K    0.060     0.013
          12 29 0120       4.1       10.6                     17      6.70         14     0.020     0.200K    0.140     0.006
          12 29 0170       4.1       11.0                     20      6.70         17     0.030     0.200K    0.060     0.008
75/07/23  14 30 0000      22.4        8.6        156          31      7.40         16     0.020     0.200K    0.020K    0.004
          14 30 0005      21.7        8.4                     30      7.35         17     0.020K    0.200K    0.020K    0.004
          14 30 0015      19.7        8.2                     24      7.60         15     0.020K    0.200     0.020K    0.005
          14 30 0030      11.6        9.6                     19      7.40         25     0.030     0.200K    0.020K    0.002K
          14 30 0060       7.3       10.6                     17      7.20         22     0.020     0.220K    0.060     0.003K
          14 30 0100       6.5        8.2                     16      7.10         23     0.030     0.200K    0.040     0.004K
          14 30 0140       5.8       10.5                     15      7.10         23     0.020     0.200K    0.080     0.003K
          14 30 0175       5.2       10.8                     16      7.05         25     0.020K    0.200     0.080     0.003K
75/09/11  10 10 0000      14.3        8.2        120          27      6.90         25     0.020K    0.200K    0.020K    0.004
          10 10 0005      14.4        8.4                     32      6.70         30     0.020K    0.200K    0.020K    0.003
          10 10 0033      11.4        8.2                     13      6.70         26     0.020K    0.200K    0.020K    0.003
          10 10 0050       7.7        9.2                      1      6.65         22     0.020K    0.200K    0.030     0.004
          10 10 0090       4.3       10.4                      1      6.60         14     0.020K    0.200K    0.040     0.004
          10 10 0130       3.7       10.6                      1      6.50         25     0.020K    0.200K    0.080     0.006
          10 10 0170       2.6       10.2                      3      6.50         22     0.020K    0.200K    0.090     0.006
          10 10 0210       2.1        9.6                      4      6.40         23     0.020K    0.200K    0.140     0.006

                  K VALUE KNOWN TO BE LESS
                      THAN INDICATED
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STORET RETRIEVAL DATE 76/03/05                                          160404
NATL EUTROPHICATION SURVEY                                             46 39 35.0 116 01 35.0 3
EPA-LAS VEGAS                                                          DWORSHAK RESERVOIR
                                                                       16035   IDAHO
                                                                                              130494

                                                                       11EPALES             2111202
                                                                        0000 FEET  DEPTH  CLASS 00


                                  00665     32217      00031
  DATE     TIME DEPTH  PHOS-TOT  CHLRPHYL  INCDT LT
  FROM     OF                       A       REMNING
   TO      DAY  FEET   MG/L P     UG/L     PERCENT

75/06/07 12 20 0000     0.014        1.6
         12 20 0005     0.015
         12 20 0025     0.016
         12 20 0065     0.016
         12 20 0120     0.021
         12 20 0175     0.020
75/07/23 14 30 0000     0.014        1.3
         14 30 0005     0.012
         14 30 0025     0.013
         14 30 0030     0.008
         14 30 0060     0.007
         14 30 0107     0.006
         14 30 0140     0.007
         14 30 0175     0.007
75/09/11 10 10 0000     0.009        1.9
         10 10 0005     0.006
         10 10 0033     0.013
         10 10 0050     0.007
         17 10 0090     0.008
         10 10 0120     0.008
         10 10 0170     0.011
         10 10 0210     0.011
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STORET RETRIEVAL DATE 76/08/25                              160405
NAT'L EUTROPHICATION SURVEY                                 46 36 42.0 116 08 30.0 3
EPA-LAS VEGAS                                               DWORSHAK RESERVOIR
                                                            16035   IDAHO
                                                                                 130891

                                                            11EPALES          2111202
                                                             0000 FEET  DEPTH  CLASS 00

                        00010     00300     00077     00094     00400     00410     00610     00625     00630     00671
  DATE    TIME DEPTH    WATER      DO      TRANSP   CNDUCTVY     PH      T ALK     NH3-N   TOT KJEL   NO2&NO3  PHOS-DIS
  FROM     OF           TEMP               SECCHI    FIELD               CACO3     TOTAL      N       N-TOTAL    ORTHO
   TO     DAY  FEET     CENT      MG/L     INCHES   MICROMHO     SU      MG/L      MG/L      MG/L      MG/L      MG/L P

75/04/07 13 00 0000      4.5      11.2       46        17       6.90      17      0.020    0.200K    0.070     0.011
         13 00 0005      4.3      11.4                 16       6.80      16      0.020    0.200K    0.070     0.004
         13 00 0025      4.1      11.2                 16       6.70      19      0.070    0.200K    0.070     0.005
         13 00 0065      4.2      11.2                 16       6.60      19      0.030    0.250K    0.060     0.005
         13 00 0129      4.1      11.4                 15       6.50      22      0.030    0.700     0.070     0.006
         13 00 0179      4.2      11.3                 13       6.70      23      0.030    0.200K    0.070     0.007
75/07/23 15 40 0000     22.4       8.2      126        34       8.05      26      0.070    0.200K    0.030     0.013K
         15 00 0005     22.5       7.8                 30       8.00      20      0.020K   0.200K    0.020K    0.010K
         15 00 0025     17.6       9.0                 25       7.40      26      0.020K   0.200K    0.020K    0.012K
         15 00 0030     11.6       9.6                 20       7.20      26      0.040    0.200K    0.030     0.013K
         15 00 0060      7.1      10.8                 18       7.20      25      0.070K   0.200K    0.060     0.013K
         15 00 0100      6.3      11.0                 19       7.20      20      0.070K   0.200K    0.060     0.012K
         15 00 0140      5.2      10.8                 18       7.20      20      0.020    0.200K    0.040     0.014K
         15 00 0175      5.1      10.6                 15       7.20      20      0.020K   0.200K    0.060     0.013K
75/09/11 10 40 0000     25.4       8.7       46        22       6.60      15      0.070K   0.200K    0.020K    0.003
         10 40 0005     25.4       8.3                 21       5.85      13      0.070K   0.200K    0.020K    0.007
         10 40 0025     14.4       8.6                 17       5.60      14      0.070K   0.700K    0.020K    0.002
         10 40 0032     11.4       8.2                  8       6.60      10K     0.022K   0.200K    0.020K    0.007
         10 40 0060      5.6      10.0                  1       6.60      15      0.020K   0.200K    0.040     0.003
         10 40 0119      4.8      10.4                  1       6.7       19      0.020K   0.200K    0.040     0.005
         10 40 0160      3.2      10.2                  1       6.6       18      0.020K   0.250K    0.060     0.005
         10 40 0217      2.1      10.2                 14       6.60      14      0.034    0.200K    0.070     0.005

         K VALUE KNOWN TO BE LESS
              THAN INDICATED
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STORET RETRIEVAL DATE 75/09/25                                160405
NATL EUTROPHICATION SURVEY                                    46 38 42.0 116 04 30.0 3
EPA-LAS VEGAS                                                 DWORSHAK RESERVOIR
                                                              16035   IDAHO
                                                                                   170691

                                                              11EPALES              2111202
                                                               0000 FEET  DEPTH  CLASS 00

                                00665     32217     00031
  DATE   TIME DEPTH PHOS-TOT  CHLRPHYL  INCDT LT
  FROM    OF                     A      REMNING
   TO    DAY  FEET   MG/L P     UG/L    PERCENT

75/04/07 13 00 0000   0.017       0.5
         13 00 0005   0.016
         13 00 0015   0.015
         13 00 0045   0.015
         13 00 0120   0.017
         13 00 0170   0.018
75/07/23 15 00 0000   0.004       3.2
         15 00 0005   0.004
         15 00 0015   0.011
         15 00 0030   0.005
         15 00 0060   0.005
         15 00 0100   0.006
         15 00 014-   0.006
         15 00 017-   0.007
75/09/11 10 40 0000   0.011       1.9
         10 40 0005   0.010
         10 40 0025   0.010
         10 40 0032   0.004
         10 40 0060   0.006
         10 40 0110   0.008
         10 40 0160   0.004
         10 40 0210   0.011
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APPENDIX D

TRIBUTARY AND WASTEWATER TREATMENT PLANT DATA

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STORET RETRIEVAL DATE 76/04/05                                           160441
NATL EUTROPHICATION SURVEY                                              46 30 56.0 116 17 45.0 4
EPA- LAS VEGAS                                                          CLEARWATER RIVER
                                                                        16      15 AHSAHKA
                                                                        D/DWORSHAK RESERVOIR      160491
                                                                        BELO DWORSHAK DAM 1.5 MI NE OF AHSAHKA
                                                                        11EPALES             2111204
                                                                         0000 FEET  DEPTH  CLASS 00

                               00630      00625      00610      00671      00665
  DATE    TIME DEPTH NO2&NO3   TOT KJEL   NH3-N      PHOS-DIS   PHOS-TOT
  FROM     OF        N-TOTAL      N       TOTAL      ORTHO
   TO     DAY  FEET   MG/L       MG/L      MG/L      MG/L P     MG/L P

74/10/19 09 20       0.072      0.100K     0.025      0.005      0.010
74/11/17 17 00       0.040      0.100      0.025      0.005      0.010K
74/12/06 08 00       0.070      0.300      0.020      0.005      0.010K
75/01/27 12 00       0.300      0.100      0.016      0.016      0.014
75/02/19             0.083      0.300      0.016      0.008K     0.010K
75/04/05 10 10       0.300      0.500      0.010      0.005      0.010K
75/04/15 11 00       0.150      0.650      0.020      0.005K     0.020
75/06/29 20 00       0.145      0.550      0.070      0.010      0.020
75/07/16 16 00       0.120      0.150      0.020      0.010      0.020
75/08/17 18 30       0.015      0.400      0.015      0.005K     0.040
75/09/15 13 30       0.046      0.200      0.010      0.005      0.020

   K VALUE KNOWN TO BE LESS
        THAN INDICATED
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STORET RETRIEVAL DATE 76/05/25                                     160447
NATL EUTROPHICATION SURVEY                                         46 30 28.0 115 37 10.0 4
EPA- LAS VEGAS                                                     N FK CLEARWATER RIVER
                                                                   16      7.5 SHEEP MTN
                                                                   T/DWORSHAK RESERVOIR      130491
                                                                   HWY RD BRDG .2 MI N OF AQUARIUS CAMPGRND
                                                                   11EPALES             2111204
                                                                    0000 FEET  DEPTH  CLASS 00

                             00630      00625      00610      00671      00665
  DATE    TIME DEPTH NO2&NO3  TOT KJEL    NH3-N    PHOS-DIS   PHOS-TOT
  FROM     OF        N-TOTAL     N        TOTAL     ORTHO
   TO     DAY  FEET   MG/L      MG/L      MG/L     MG/L P     MG/L P

74/10/09 13 30        0.026     0.100K    0.019     0.005K     0.005K
74/11/17 10 45        0.026     0.100K    0.020     0.005K     0.010K
75/04/12 12 35        0.025     1.600     0.075     0.005      0.020
75/06/06 13 00        0.020     0.550     0.015     0.005      0.010
75/07/14 17 05        0.005     0.150     0.025     0.005      0.020
75/08/17 15 20        0.005     1.100     0.010     0.005K     0.030
75/09/13 16 00        0.143     0.200               0.007      0.040

   K VALUE KNOWN TO BE LESS
      THAN INDICATED
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STORET RETRIEVAL DATE 76/08/05
NAT'L EUTROPHICATION SURVEY
EPA- LAS VEGAS
                                                                  160481
                                                                 46 42 28.0 116 11 55.0 4
                                                                 ELK CREEK
                                                                 16      7.5 ELK CRK FALS
                                                                 T/DWORSHAK RESERVOIR       170491
                                                                 JEEP TRL 2 MI NW OF ELK CRK PICNIC AREA
                                                                 11EPALES              2111204
                                                                  0000 FEET  DEPTH  CLASS 00

                              00630      00625      00610      00671      00665
  DATE   TIME DEPTH NO2&NO3  TOT KJEL    NH3-N     PHOS-DIS   PHOS-TOT
  FROM    OF        N-TOTAL     N        TOTAL     ORTHO
   TO    DAY  FEET   MG/L      MG/L      MG/L      MG/L P     MG/L P

74/10/04 12 15       0.010     0.300     0.007     0.005      0.010
74/11/17 15 00       0.008     0.100K    0.015     0.010      0.010
75/06/20 16 35       0.005     0.200     0.010     0.020      0.040
75/06/28 15 45       0.005     0.200     0.005     0.010      0.020
75/07/20 13 00       0.010     0.225     0.027     0.010      0.030
75/08/24 10 30       0.005     0.400     0.030     0.005K     0.060
75/09/13 10 30       0.010     0.250     0.025     0.020      0.045

     K VALUE KNOWN TO BE LESS
       THAN INDICATED
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STORET RETRIEVAL DATE 76/08/25                                        1604C1
NAT'L EUTROPHICATION SURVEY                                          46 39 20.0 116 07 50.0 4
EPA- LAS VEGAS                                                       CRANBERRY CREEK
                                                                     16      7.5 ELK CRK FALS
                                                                     T/DWORSHAK RESERVOIR     170001
                                                                     UNPVD RD BRDG 3 MI W OF FIVE CORNERS JCT
                                                                     11EPALES              2111204
                                                                      0000 FEET  DEPTH  CLASS 00

                          00630       00625       00610       00671       00665
  DATE    TIME DEPTH NO2&NO3     TOT KJEL     NH3-N     PHOS-DIS    PHOS-TOT
  FROM     OF         N-TOTAL       N         TOTAL      ORTHO
   TO     DAY  FEET    MG/L        MG/L        MG/L       MG/L P      MG/L P

74/10/14 13 05        0.026       0.300       0.010       0.020       0.045
74/11/16 14 00        1.026       0.100K      0.015       0.025       0.025
74/12/26 09 00        0.796       1.400       0.105       0.020       0.040
75/06/16 14 10        0.035       0.500       0.020       0.015       0.030
75/06/28 11 15        0.010       0.400       0.020       0.015       0.015
75/07/19 17 45        0.010       0.250       0.030       0.010       0.010
75/08/16 13 00        0.005       0.400       0.010       0.005K      0.020
75/09/13 09 00        0.011       0.200       0.020       0.015       0.050


       K VALUE KNOWN TO BE LESS
          THAN INDICATED
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STORET RETRIEVAL DATE 76/10/25
NATL EUTROPHICATION SURVEY
EPA- LAS VEGAS
                                                                  160401
                                                                 44 40 00.0 116 01 40.0 4
                                                                 SWAMP CREEK
                                                                 16      7.5 LITL BRN *??
                                                                 T/CASCADE RESERVOIR     130491
                                                                 UNPVD RD BRDG 2.5 MI N OF BARTLETTS POINT
                                                                 11EPALES            2111204
                                                                  0000 FEET  DEPTH  CLASS 00

                          00630      00625      00610      00671      00665
   DATE   TIME DEPTH NO2&NO3    TOT KJEL    NH3-N     PHOS-DIS   PHOS-TOT
   FROM    OF        N-TOTAL       N        TOTAL      ORTHO
    TO    DAY  FEET   MG/L        MG/L       MG/L      MG/L P     MG/L P

74/10/24 14 00          0.014      0.600      0.010      0.025      0.025
74/11/26 12 07          0.014      0.200K     0.073      0.005      0.005
74/12/06 11 09          0.026      0.500      0.050      0.025      0.030
75/04/26 15 30          0.005      0.100      0.010      0.030      0.050
75/06/28 11 50          0.011      1.000      0.029      0.025      0.030
75/07/24 11 35          0.015      0.150      0.020      0.020      0.020
75/08/14 13 30          0.006      1.000      0.020      0.005K     0.040
75/09/13 09 35          0.002      0.300      0.025      0.015      0.030

          K VALUE KNOWN TO BE LESS
            THAN INDICATED
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STORET RETRIEVAL DATE 76/04/25
NAT'L EUTROPHICATION SURVEY
EPA- LAS VEGAS
                                                                    1604E1
                                                                   46 44 05.0 115 41 20.0 4
                                                                   WEITAS CREEK
                                                                   16      7.5 LITL BAR MTN
                                                                   T/DWORSHAK RESERVOIR      170491
                                                                   PAR 300 FT N BNPWD RD 3,4 * E LTTL GR MT
                                                                   11EPALES              2111204
                                                                    0000 FEET  DEPTH  CLASS 00

                              00630     00625     00610     00671     00665
  DATE    TIME DEPTH NO2&NO3  TOT KJEL   NH3-N   PHOS-DIS  PHOS-TOT
  FROM     OF        N-TOTAL     N       TOTAL    ORTHO
   TO     DAY  FEET   MG/L     MG/L      MG/L     MG/L P    MG/L P

74/10/19 14 30          0.016     0.400     0.005     0.010     0.035
74/11/16 10 30          0.024     0.200     0.015     0.010     0.010
74/12/26 15 00          0.026     0.500     0.030     0.005     0.010K
75/04/15 10 15          0.005     0.200     0.010     0.010     0.020
75/06/20 14 30          0.010     0.750     0.020     0.005     0.010K
75/07/14 12 30          0.010     0.100     0.015     0.005     0.010K
75/08/16 13 00          0.005     0.700     0.015     0.005W    0.070
75/09/13 10 00          0.002     0.200     0.025     0.020     0.090


      K VALUE KNOWN TO BE LESS
          THAN INDICATED
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STORET RETRIEVAL DATE 76/09/25                                        160401
NAT'L EUTROPHICATION SURVEY                                          46 37 20.0 114 56 36.0 4
EPA- LAS VEGAS                                                       WEEDS CREEK
                                                                     16      15 HEADQUARTERS
                                                                     T/DWORSHAK RESERVOIR       150491
                                                                     UNMKD RD BRDG 3.2 MI N OF HWY 11 JCT
                                                                     11EPALES           2111204
                                                                      0000 FEET  DEPTH  CLASS 00

                          00630     00625     00610     00671     00665
  DATE   TIME DEPTH NO2&NO3 TOT KJEL   NH3-N   PHOS-DIS  PHOS-TOT
  FROM    OF        N-TOTAL      N     TOTAL    ORTHO
   TO    DAY  FEET    MG/L     MG/L     MG/L    MG/L P    MG/L P

74/10/24 13 35        0.032    0.400    0.010    0.025     0.025
74/11/26 13 00        0.024    0.110K   0.010    0.020     0.025
74/12/06 11 30        0.016    0.800    0.025    0.020     0.020
75/04/15 21 05        0.007    0.125    0.017    0.010     0.015
75/04/28 20 15        0.005    [illegible] 0.015 0.025     0.025
75/07/10 19 00        0.005    0.130    0.020    0.025     0.050
75/08/16 16 20        0.005    0.250    0.005K   0.040     0.060
75/09/13 17 00        0.002    0.050    0.030    0.065     0.085

           K VALUE KNOWN TO BE LESS
             THAN INDICATED
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STORET RETRIEVAL DATE 76/06/15                                     160441
NATL EUTROPHICATION SURVEY                                       46 53 06.0 115 56 20.0 4
EPA-LAS VEGAS                                                    BREAKFAST CREEK
                                                                 16      35 IDAHO BUTTES
                                                                 T/DWORSHAK RESERVOIR      130491
                                                                 BNK FSH TRL .7 MI E OF FOZEBUT TRL L4SGT
                                                                 11EPALES              2111204
                                                                  0000 FEET  DEPTH  CLASS 00

                          00630      00625      00610      00671      00665
 DATE   TIME DEPTH NO2&NO3  TOT KJEL    NH3-N    PHOS-DIS   PHOS-TOT
 FROM    OF        N-TOTAL     N        TOTAL     ORTHO
  TO    DAY  FEET   MG/L      MG/L      MG/L     MG/L P     MG/L P

74/10/29 16 37       0.024     0.200     0.015     0.020     0.022
74/11/26 11 00       0.016     0.100K    0.010     0.005K    0.005
74/12/26 12 40       0.008     0.500     0.015     0.015     0.020
75/04/15 17 45       0.033     0.400     0.020     0.030     0.030
75/06/20 17 50       0.048     1.050     0.025     0.010     0.034
75/07/24 14 30       0.070     0.350     0.015     0.010     0.020
75/08/26 12 00       0.005     0.400     0.010     0.005K    0.018
75/09/13 11 15       0.002     0.200     0.025     0.010     0.020

           K VALUE KNOWN TO BE LESS
             THAN INDICATED
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STORET RETRIEVAL DATE 76/03/25
NAT'L EUTROPHICATION SURVEY
EPA- LAS VEGAS
                                                                    160801
                                                                   46 54 15.0 115 50 55.0 4
                                                                   LTTL N FK CLEARWATER RIV
                                                                   16      15 BREWALS BUTTES
                                                                   T/DWORSHAK RESERVOIR     130891
                                                                   TRAIL BRDG .5 MI NW OF FISHING CREEK
                                                                   11EPALES             2111204
                                                                    0000 FEET  DEPTH  CLASS 00

                            00630      00625      00610      00671      00665
  DATE   TIME DEPTH NO2&NO3   TOT KJEL    NH3-N    PHOS-DIS   PHOS-TOT
  FROM    OF         N-TOTAL      N        TOTAL     ORTHO
   TO    DAY  FEET    MG/L      MG/L      MG/L      MG/L P     MG/L P

74/10/16 15 45          0.040      0.300     0.070      0.005K     0.005
74/11/16 11 00          0.056      0.100K    0.020      0.005K     0.010K
74/12/06 14 05          0.040      1.000     0.035      0.005K     0.010
75/04/15 15 35          0.005      0.650     0.015      0.015      0.050
75/05/20 19 00          0.005      0.150     0.005      0.005      0.010K
75/07/16 15 20          0.025      0.250     0.025      0.005K     0.025
75/08/16 14 00          0.005      0.450     0.005      0.020      0.040
75/09/13 12 10          0.002      0.400     0.002      0.005      0.030

         K VALUE KNOWN TO BE LESS
              THAN INDICATED
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STORET RETRIEVAL DATE 76/03/25                                        [illegible]
NATL EUTROPHICATION SURVEY                                           [illegible]
EPA- LAS VEGAS                                                       [illegible]
                                                                     [illegible]
                                                                     [illegible] RESERVOIR        [illegible]
                                                                     [illegible]
                                                                     [illegible]
                                                                      [illegible]

                              00630     00625     00610     00671     00665
  DATE    TIME DEPTH        NO2&NO3  TOT KJEL    NH3-N    PHOS-DIS  PHOS-TOT
  FROM     OF               N-TOTAL     N        TOTAL     ORTHO
   TO     DAY  FEET           MG/L     MG/L      MG/L     MG/L P    MG/L P

74/10/03 10 15                0.040    0.100K    0.015    0.005K    0.005K
74/11/07 11 00                0.040    0.400     0.075    0.005K    0.010K
75/04/12 14 00                0.065    1.100     0.025    0.079     0.011
75/06/15 11 30                0.040    0.650     0.175    0.005K    0.011
75/06/28 13 05                0.070    0.500     0.030    0.005     0.020
75/07/19 17 00                0.015    0.100     0.015    0.005K    0.010K
75/08/16 12 30                0.025    0.550     0.010    0.005K    0.010K
75/09/13 16 15                0.045    1.450     0.102    0.007     0.010

                K VALUE KNOWN TO BE LESS
                  THAN INDICATED
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APPENDIX E

PARAMETRIC RANKINGS OF LAKES
SAMPLED BY NES IN 1975

STATE OF IDAHO

Mean or median values for six of the key parameters evaluated in establishing the trophic conditions of Idaho lakes sampled are presented to allow direct comparison of the ranking, by parameter, of each lake relative to the others. Median total phosphorus, median inorganic nitrogen and median dissolved orthophosphorus levels are expressed in mg/l. Chlorophyll *a* values are expressed in ug/l. To maintain consistent rank order with the preceding parameters, the mean Secchi disc depth, in inches, is subtracted from 500. Similarly, minimum dissolved oxygen values are subtracted from 15 to create table entries.

LAKE DATA TO BE USED IN RANKINGS

LAKE CODE	LAKE NAME	MEDIAN TOTAL P	MEDIAN INORG N	500- MEAN SEC	MEAN CHLORA	15- MIN DO	MEDIAN DISS ORTHO P
1601	AMERICAN FALLS RESERVOIR	0.175	0.080	463.000	15.379	14.700	0.035
1602	CASCADE LAKE	0.032	0.060	415.067	8.081	14.800	0.029
1603	LAKE COEUR D'ALENE	0.017	0.040	380.348	10.391	12.200	0.005
1604	DWORSHAK RESERVOIR	0.018	0.090	451.066	2.420	7.400	0.009
1605	HAUSER	0.020	0.075	366.286	11.112	14.000	0.013
1606	HAYDEN LAKE	0.010	0.040	243.500	2.787	11.000	0.003
1607	ISLAND PARK RESERVOIR	0.036	0.050	391.778	9.322	12.066	0.012
1608	LAKE LOWELL	0.078	0.078	477.111	25.389	14.600	0.015
1609	MAGIC RESERVOIR	0.082	0.130	408.750	7.322	14.700	0.025
1610	PALISADES RESERVOIR	0.024	0.090	345.429	2.067	12.000	0.007
1611	LOWER PAYETTE	0.013	0.060	234.000	4.600	9.000	0.007
1612	LOWER TWIN LAKES	0.016	0.050	371.000	2.339	13.600	0.009
1613	UPPER TWIN LAKES	0.017	0.045	389.143	4.086	8.250	0.004

PERCENT OF LAKES WITH HIGHER VALUES (NUMBER OF LAKES WITH HIGHER VALUES)

LAKE CODE	LAKE NAME	MEDIAN TOTAL P	MEDIAN INORG N	500- MEAN SEC	MEAN CHLORA	15- MIN DO	MEDIAN DISS ORTHO P
1601	AMERICAN FALLS RESERVOIR	8 (1)	17 (2)	8 (1)	8 (1)	21 (2)	8 (1)
1602	CASCADE LAKE	33 (4)	54 (6)	17 (2)	42 (5)	4 (0)	50 (5)
1603	LAKE COEUR D'ALENE	67 (8)	96 (11)	58 (7)	25 (3)	67 (8)	83 (10)
1604	DWORSHAK RESERVOIR	92 (11)	17 (2)	25 (3)	83 (10)	100 (12)	50 (5)
1605	HAUSER	42 (5)	33 (4)	75 (9)	17 (2)	4 (0)	25 (3)
1606	HAYDEN LAKE	92 (11)	96 (11)	92 (11)	75 (9)	75 (9)	100 (12)
1607	ISLAND PARK RESERVOIR	25 (3)	71 (8)	42 (5)	33 (4)	54 (6)	33 (4)
1608	LAKE LOWELL	8 (1)	42 (5)	8 (1)	8 (1)	33 (4)	17 (2)
1609	MAGIC RESERVOIR	17 (2)	8 (1)	33 (4)	50 (6)	21 (2)	8 (1)
1610	PALISADES RESERVOIR	50 (6)	17 (2)	83 (10)	100 (12)	54 (6)	75 (9)
1611	LOWER PAYETTE	83 (10)	54 (6)	100 (12)	67 (8)	83 (10)	67 (8)
1612	LOWER TWIN LAKES	75 (9)	71 (8)	58 (7)	92 (11)	42 (5)	50 (5)
1613	UPPER TWIN LAKES	58 (7)	83 (10)	67 (8)	58 (7)	92 (11)	92 (11)

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